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United States Patent [19] Ekiriwang et al.

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[54] **CARRIER FOR CUVETTES**
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[73] Assignee: **Abbott Laboratories**, Abbott Park, Ill.

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[21] Appl. No.: **09/058,552**

Primary Examiner—Long V. Le

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Attorney, Agent, or Firm—Mark C. Bach

[51] **Int. Cl.⁶** **G01N 37/00**

[57] ABSTRACT

[52] **U.S. Cl.** **422/104; 422/63; 422/99;**
436/43; 436/183; 294/1.1; 294/27.1

Embodiments of a carrier and methods of its use are disclosed. In one embodiment, the carrier is for a container having a positioning device to be used with a medical diagnostic analyzer. The carrier comprises a planar member and a container retaining member disposed on the planar member. The container retaining member has a configuration matable with a positioning device on the container such that the container is releasably retained with the carrier.

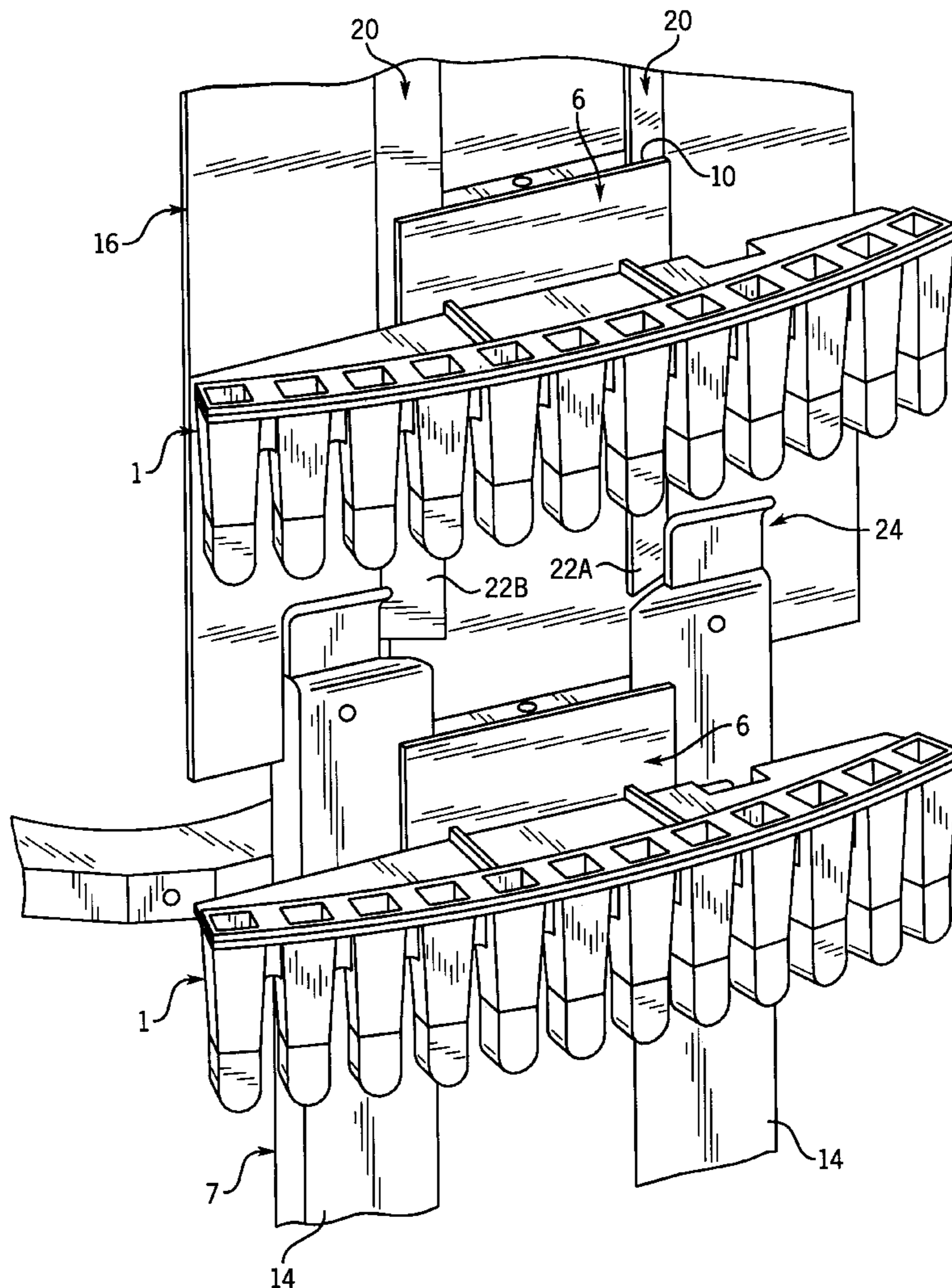
[58] **Field of Search** 422/63, 99, 102–104;
436/43, 183; 294/1.1, 27.1

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5 Claims, 5 Drawing Sheets



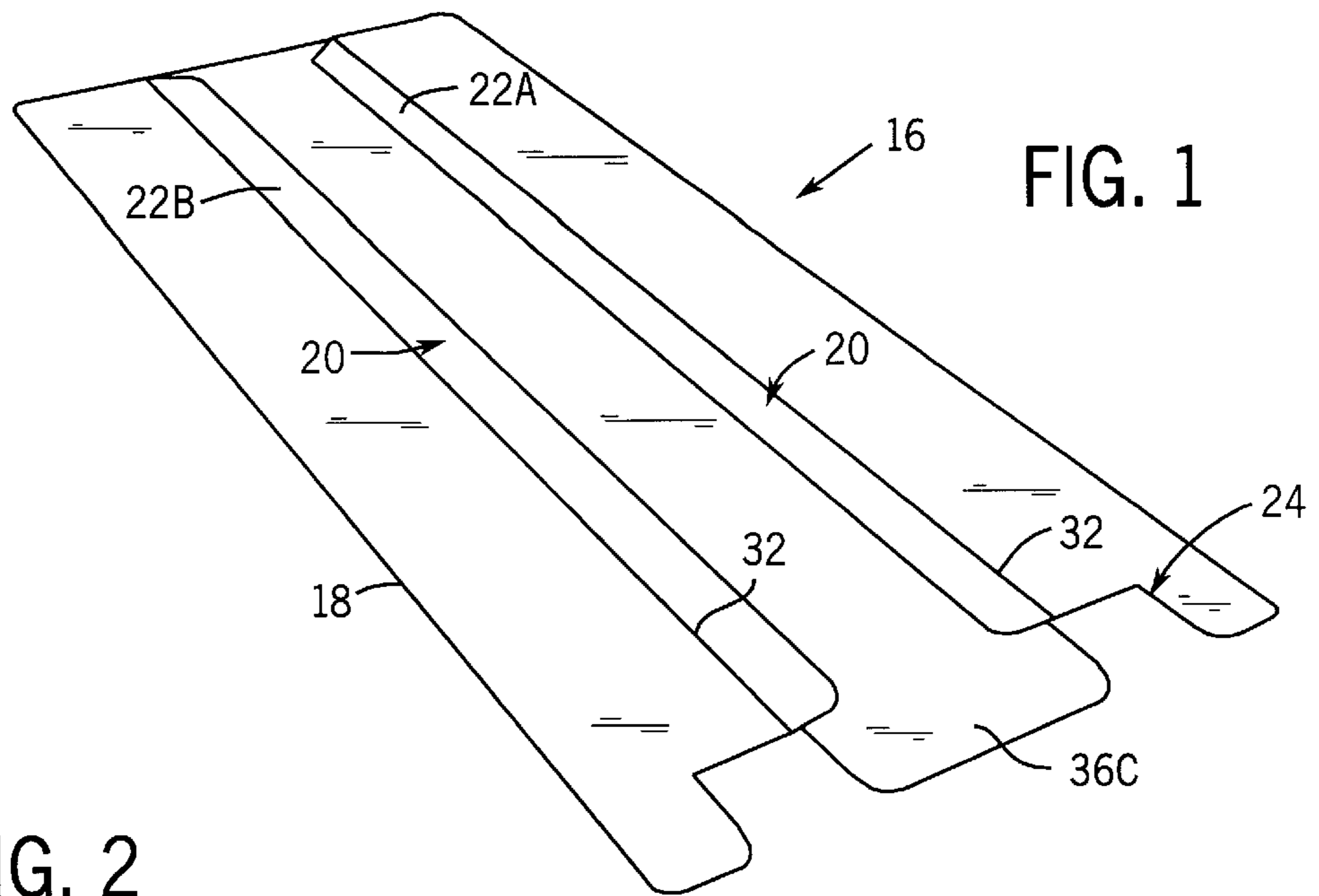


FIG. 1

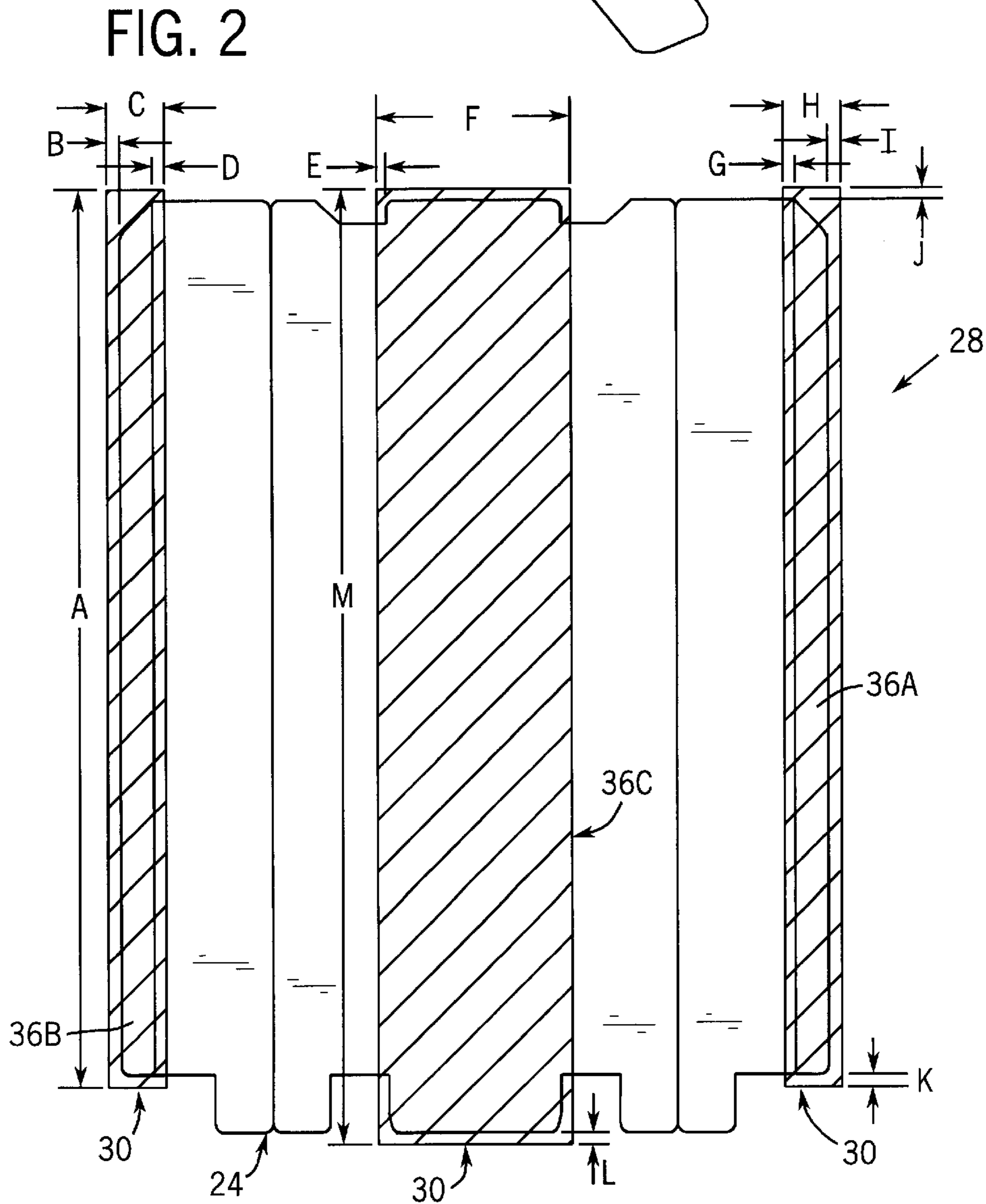


FIG. 2

FIG. 3

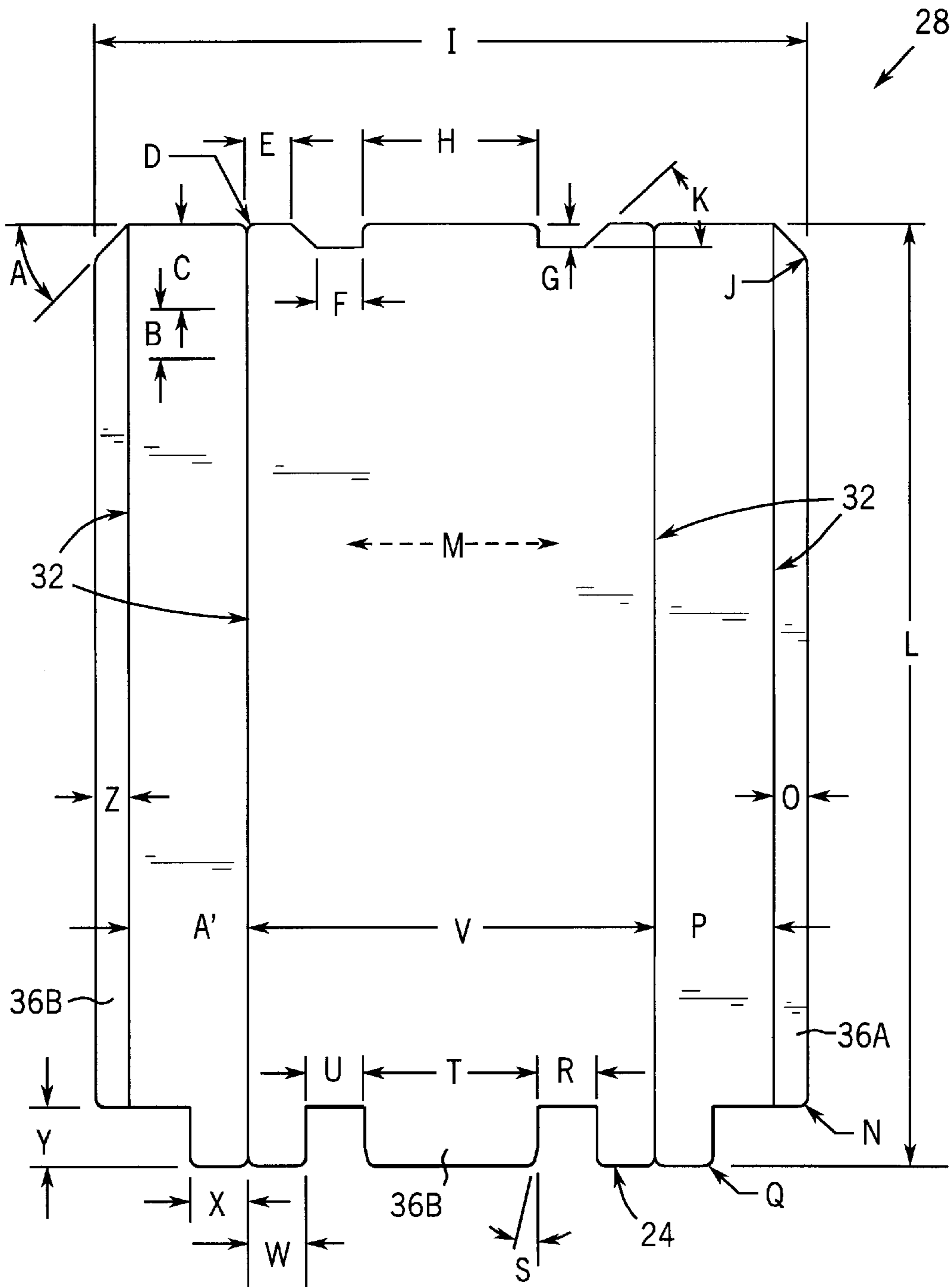


FIG. 4

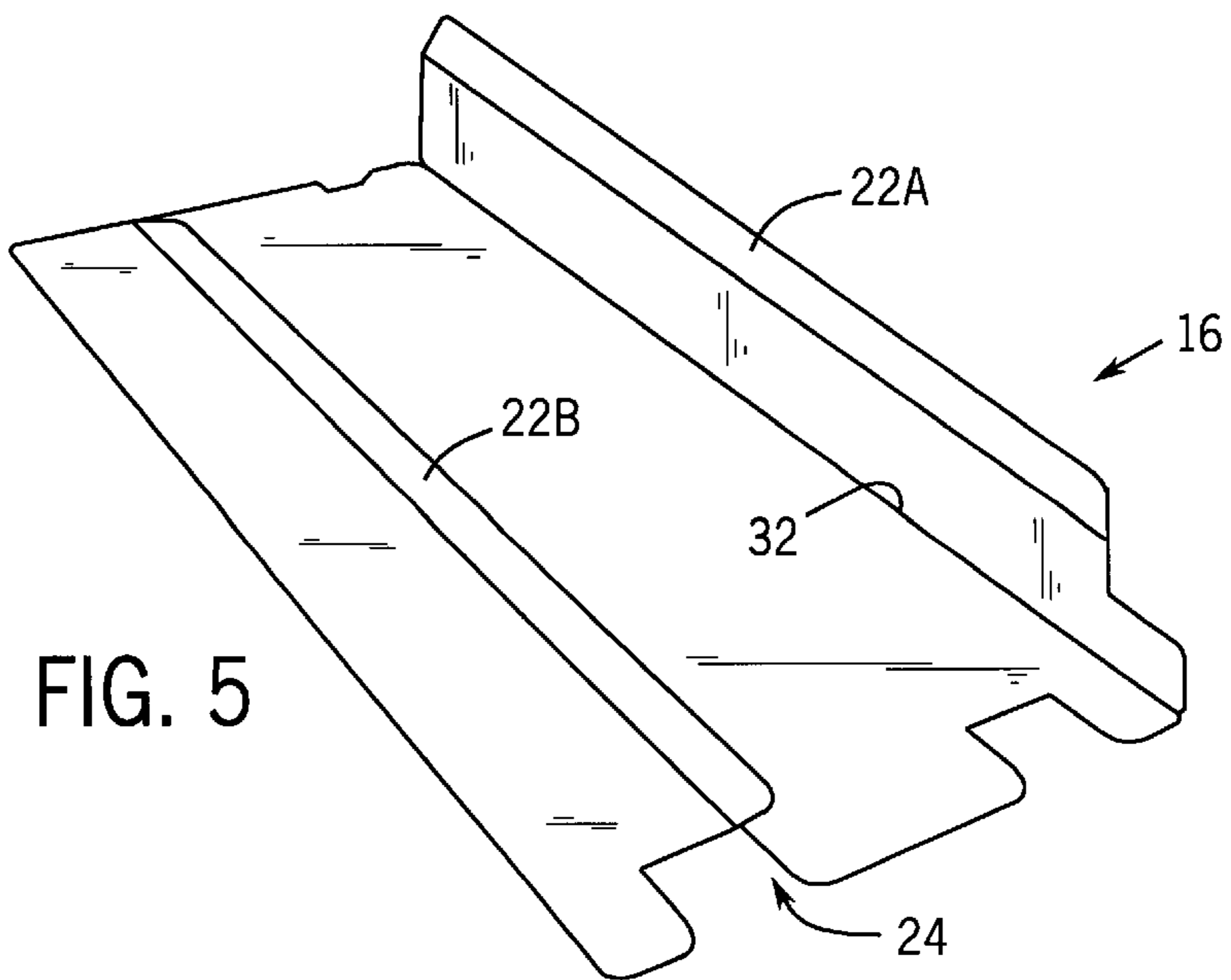
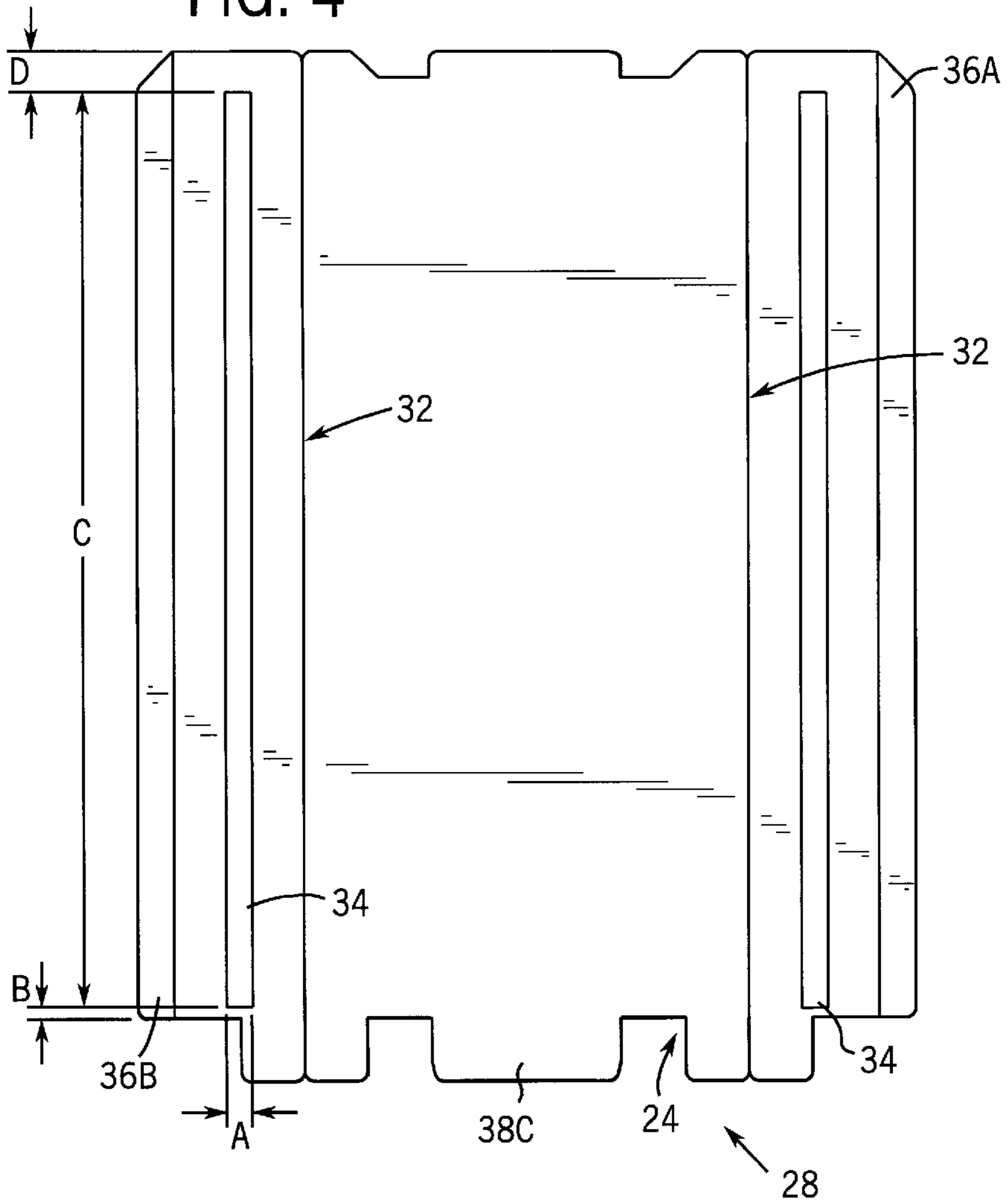
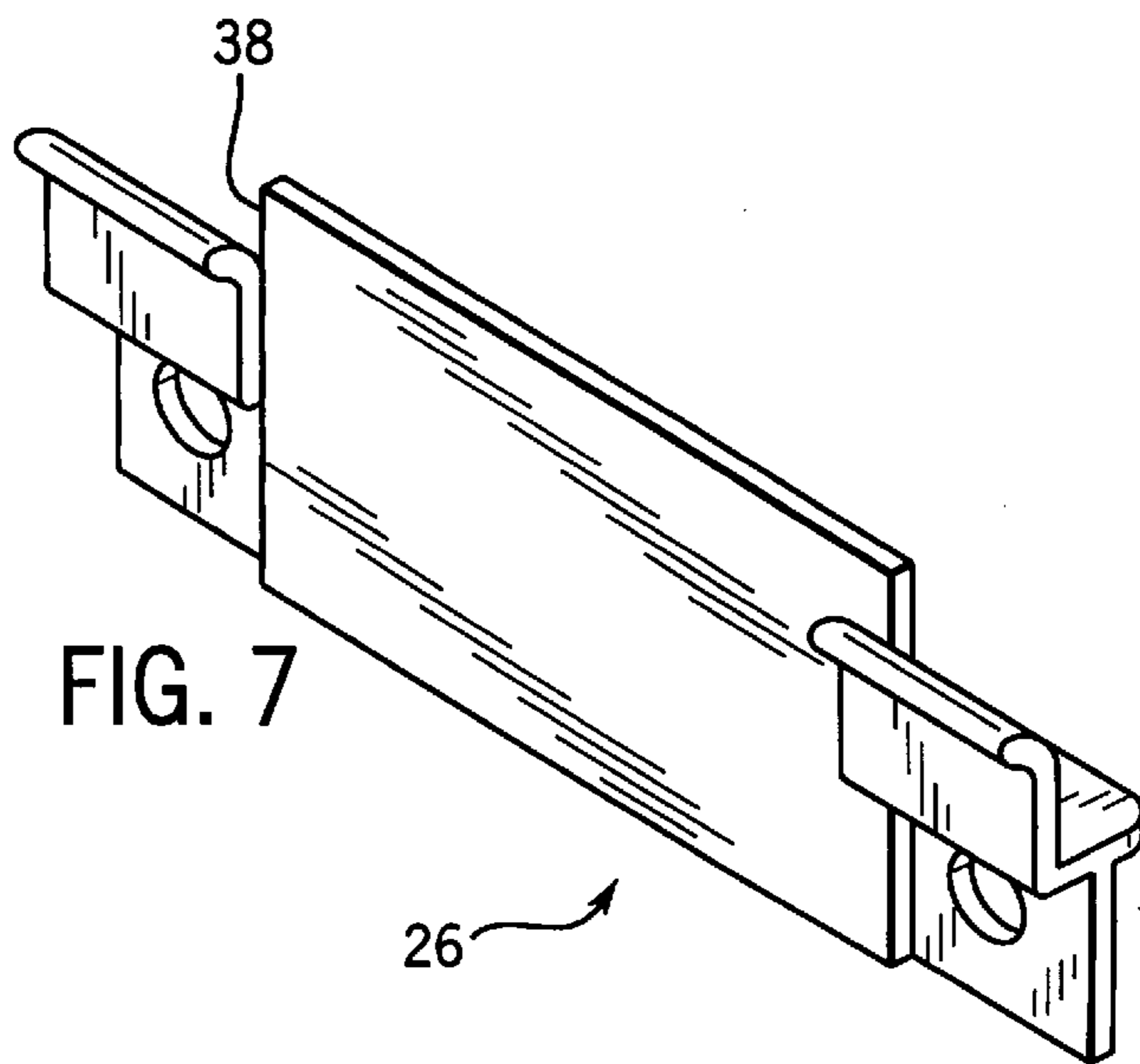
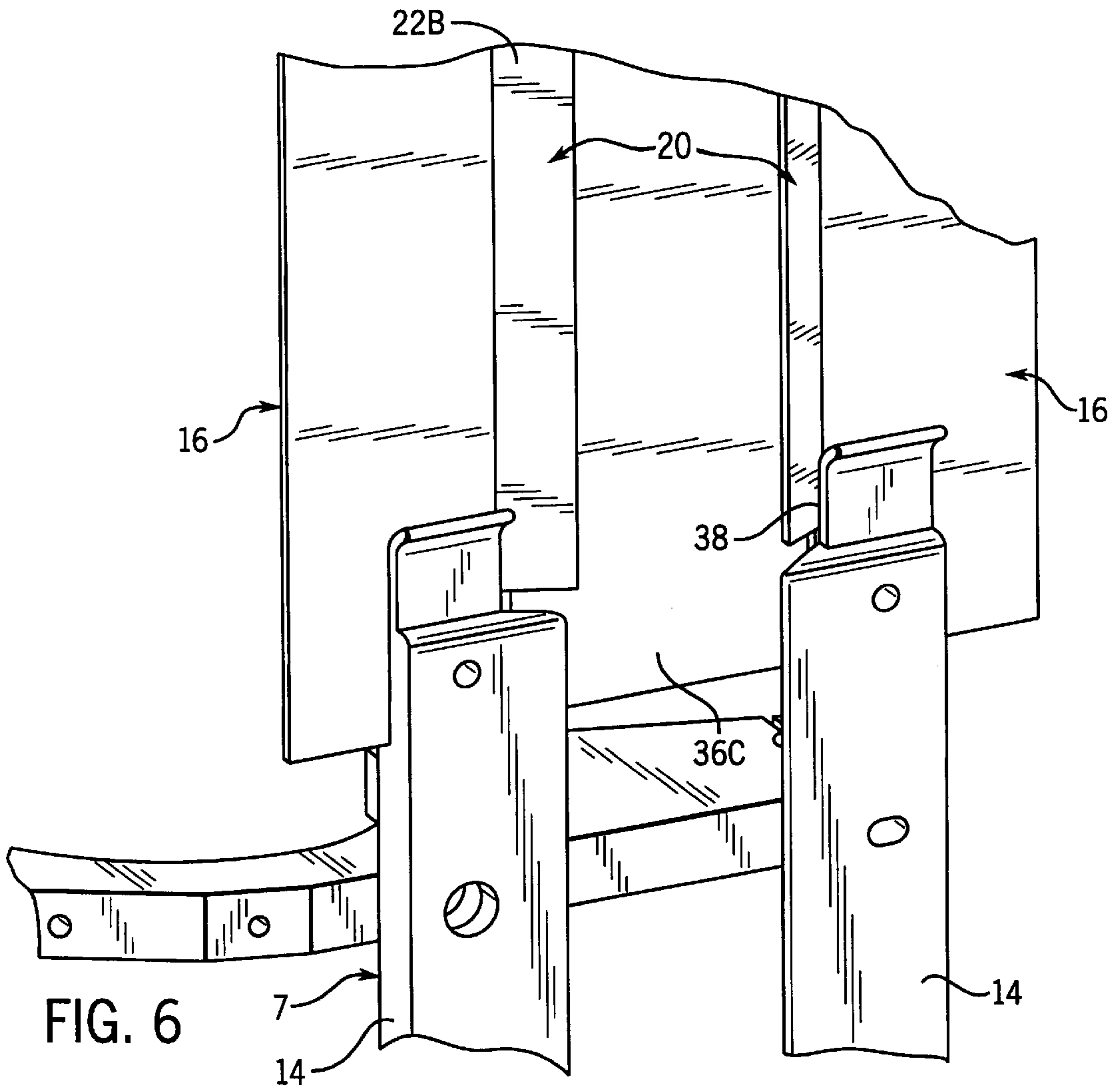


FIG. 5



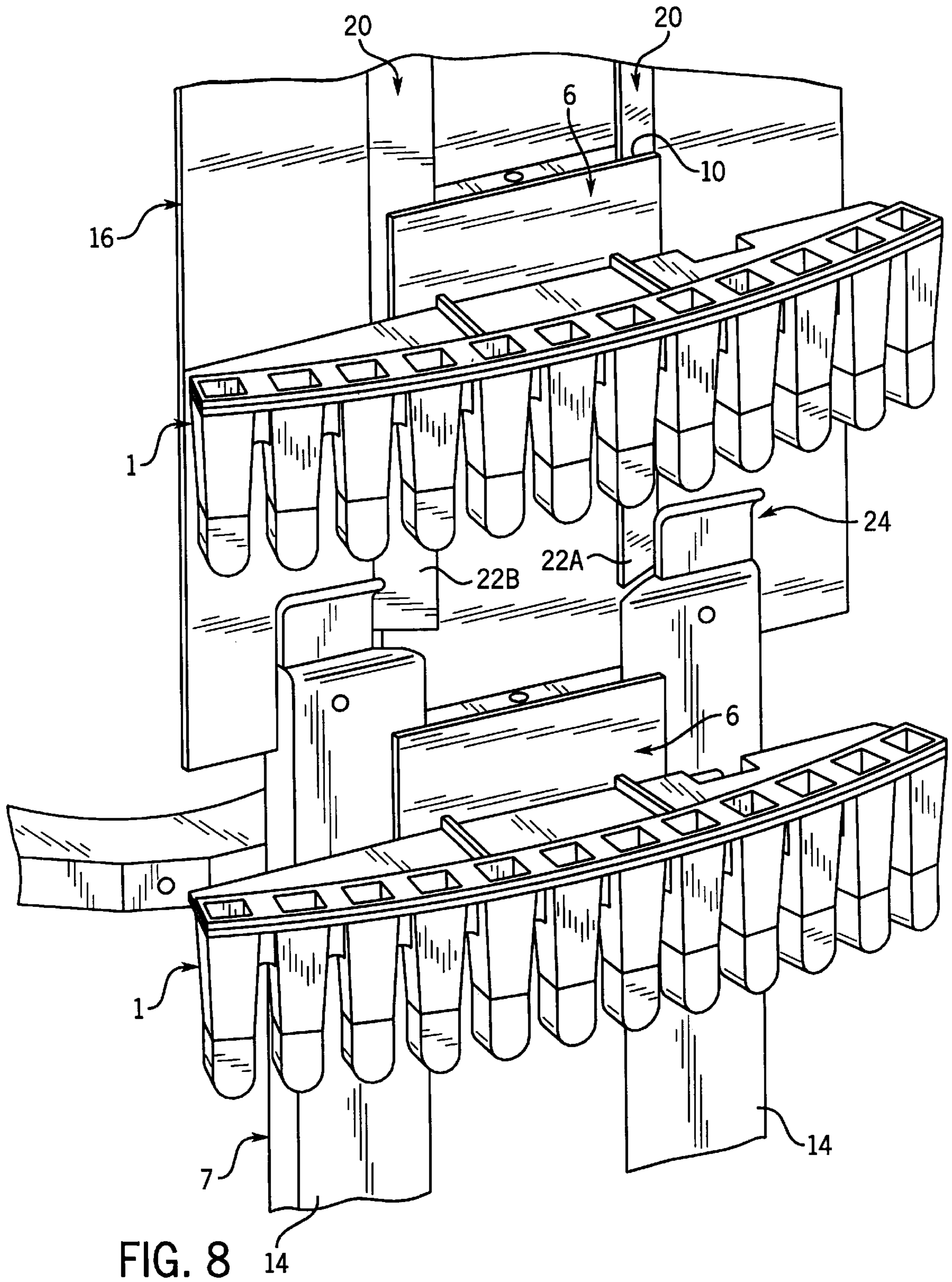


FIG. 8 14

1 CARRIER FOR CUVETTES

BACKGROUND

This case relates generally to a carrier and a method of use of that carrier. More specifically, this case relates to a carrier for a cuvette used in a medical diagnostic analyzer and a method of using such a carrier.

Medical diagnostic analyzers are machines that process a sample and determine an element of the sample. For example, a medical diagnostic analyzer may process a human blood sample and may determine an amount of cholesterol in that human blood sample.

To do this, the sample may be added to a container, such as a reaction vessel, a cuvette and the like, on the medical diagnostic analyzer. The medical diagnostic analyzer may add other things, such as reagents, etc., to the sample in the container and "look" at the container to determine the element of interest.

Some medical diagnostic analyzers can process a number, such as 250, of samples in a given time period, such as 1 hour. If one container is used for each sample processed, then the medical diagnostic analyzer needs a suitable supply of containers to do the desired processing.

In some cases, a supply of containers are loaded onto the medical diagnostic analyzer. Because the containers may be relatively small, loading of the containers onto the medical diagnostic analyzer may require some effort and time. Also, because the containers are looked at to determine the element of interest in the sample, it is desirable to keep the containers relatively clean, e.g. free of finger prints, etc. Accordingly, it is desirable to provide a carrier that may facilitate loading of containers onto an medical diagnostic analyzer, transport of containers, etc.

SUMMARY

Embodiments of a carrier and methods of its use are disclosed. In one embodiment, the carrier is for a container having a positioning device to be used with a medical diagnostic analyzer. The carrier comprises a planar member and a container retaining member disposed on the planar member. The container retaining member has a configuration matable with a positioning device on the container such that the container is releasably retained with the carrier.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of an embodiment of a carrier described herein;

FIG. 2 is a generic elevational view of a blank being constructed into the carrier of FIG. 1;

FIG. 3 is another generic elevational view of a blank being constructed into the carrier of FIG. 1;

FIG. 4 is an additional generic elevational view of a blank being constructed into the carrier of FIG. 1;

FIG. 5 is a perspective view of a blank being constructed into the carrier of FIG. 1;

FIG. 6 is a perspective view of the carrier of FIG. 1 joined with one embodiment of a mating portion of a medical diagnostic analyzer;

FIG. 7 is a perspective view of the mating portion of the medical diagnostic analyzer of FIG. 6 mated with the carrier of FIG. 1; and

FIG. 8 is a perspective view, similar to that of FIG. 6, illustrating loading of containers onto the medical diagnostic analyzer with aid of the carrier of FIG. 1.

2

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENTS

FIG. 1 illustrates one embodiment of a carrier **16** which may be used for loading a container **1** onto an instrument, such as a medical diagnostic analyzer and the like. For the sake of clarity of understanding, construction, operation and use of the carrier **16** are discussed hereinbelow with respect to the container **1** and the medical diagnostic analyzer described in U.S. Pat. No. 5,456,882 and European Patents No.'s EP 0 557 400 B1 and EP 0 557 403 B1. Those patents are assigned to the assignee of the present case and the disclosures thereof are incorporated herein in their entirety by this reference. To further facilitate understanding, reference characters in this case are preserved from the 882 patent referenced above. However, it is to be recognized that the carrier **16** may be utilized with other containers and other methods of use. Additionally, steps comprising methods of construction and/or methods of use of the carrier **16** may be performed in any appropriate manner and may be combined with steps of other methods to arrive at yet additional methods.

Referring to FIG. 1, the carrier **16** generally comprises a substantially planar member **18** including a container **1** retaining member **20** disposed on the planar member **18**. The container **1** retaining member **20** has a configuration which is matable with the positioning device **6** on the container **1** such that the container **1** is releasably retained with the carrier **16** and such that the carrier **16** is releasably engageable with the positioning device **6** on the container **1** such that the container **1** can be releasably or slidably retained with the carrier **16**. In the illustrated embodiment, the container retaining member **20** comprises at least one flap, i.e. a pair of opposed flaps **22A** and **22B** configured for removable insertion into grooves **10** on the positioning device **6** of the container **1**. Other constructions of the container **1** retaining member **20** are also possible depending upon the construction of the positioning device **6**.

The carrier **16** also includes an instrument engaging portion **24** which releasably mates with a mounting element **26** (FIG. 7) located on a machine, such as an automatic medical diagnostic analyzer and the like, which utilizes the container **1**. The illustrated embodiment of the carrier **16** is dimensioned such that a plurality, such as about 8 containers **1**, may be disposed on the carrier **16** in intended fashion at any given time.

Further details of the carrier **16** may be appreciated upon review of the following discussion of an exemplary method of construction of one embodiment of the carrier **16**. It is to be noted that other methods of construction are also possible. Furthermore, while particular exemplary materials and dimensions may be listed, other materials and dimensions may be used as appropriate.

Construction of the carrier **16** can begin with a suitable raw material, such as a card stock and the like. In one embodiment, the raw material may be an approximately 0.016 inch thick solid bleached sulfate paper board, such as 16PT EVEREST FC8 NEW SHADE available from International Paper of Memphis, Tenn., having at least one clay coated side and one uncoated side. The raw material is cut to form a blank **28** having a configuration shown in FIG. 2. In one embodiment, the blank **28** may have approximately the following dimensions.

REFERENCE	DIMENSION
A	9 $\frac{7}{8}$ "
B	$\frac{1}{8}$ "
C	$\frac{5}{8}$ "
D	$\frac{1}{8}$ "
E	$\frac{1}{8}$ "
F	2 $\frac{1}{16}$ "
G	$\frac{1}{8}$ "
H	$\frac{5}{8}$ "
I	$\frac{1}{8}$ "
J	$\frac{1}{8}$ "
K	$\frac{1}{8}$ "
L	$\frac{1}{8}$ "
M	10 $\frac{1}{2}$ "

The blank **28** may then be subjected to a coating procedure, such as a print press run and the like. In one method, this coating procedure comprises adding a spot of an aqueous coating, such as Nicoat work-in-turn gloss coating, formula #89100, available from Nicoat of Bensenville, Ill., to at least portions of at least one side of the blank **28**. In one embodiment, this coating may be disposed on a clay coated side of the blank **28**. An area occupied by the coating is indicated by reference character **30** on FIG. **2**. Dimensions B and I represent "bleed" areas of the coating.

Next, the blank **28** is fabricated into a configuration illustrated in FIG. **3**. Specifically, the blank **28** may be cut, e.g. die cut, crimped, perforated, creased, scored and/or embossed as appropriate. The blank **28** now may have approximately the following dimensions.

REFERENCE	DIMENSION
A	45 degrees
B	$\frac{1}{2}$ "
C	$\frac{7}{8}$ "
D	$\frac{1}{8}$ " radius
E	$\frac{1}{2}$ "
F	$\frac{1}{2}$ "
G	$\frac{1}{4}$ "
H	1 $\frac{13}{16}$ "
I	7 $\frac{17}{32}$ "
J	$\frac{1}{4}$ " radius
K	45 degrees
L	10 $\frac{1}{4}$ "
M	Grain
N	$\frac{1}{8}$ " radius
O	$\frac{3}{8}$ "
P	1 $\frac{15}{64}$ "
Q	$\frac{1}{8}$ " radius
R	1 $\frac{1}{16}$ "
S	15 degrees
T	1 $\frac{3}{4}$ "
U	1 $\frac{1}{16}$ "
V	4 $\frac{5}{16}$ "
W	1 $\frac{9}{32}$ "
X	1 $\frac{9}{32}$ "
Y	$\frac{5}{8}$ "
Z	1 $\frac{15}{64}$ "
A'	$\frac{3}{8}$ "

In an exemplary embodiment, the blank **28** may be subjected to a process known to those skilled in the relevant art as "perf-in-channel" or "cut-in-crease" to form alternating scores, perforations and/or creases to facilitate further construction of the carrier **16**. That process may produce, among other things, at least one arrangement of cuts and creases on the blank **28**. In the illustrated embodiment, the arrangement is indicated by reference character **32** and may comprise four substantially linear segments consisting of alternating cuts and creases, each being about 0.5" in length.

Now, an adhesive **34** may be applied to the blank **28**, as shown in FIG. **4**. The adhesive **34** may be Resyn 33-9159

available from National Starch and Chemical of Bridgewater, N.J. Reference may be had to U.S. Pat. No. 5,100,944 for further details regarding the adhesive **34**. The adhesive **34** may be applied by a suitable machine, such as a Mactron computerized gluing system available from Mactron of Alsip, Ill., in a "cold" state to form a number, such as two, of lines on the blank **28**. Locations and dimensions of the adhesive **34** on the blank **28** have been empirically determined such that the carrier **16** retains the container(s) **1** in the desired manner, i.e. the flaps **22A** and **22B** remain sufficiently flexible. The blank **28** has the following approximate dimensions.

REFERENCE	DIMENSION
A	$\frac{1}{4}$ "
B	$\frac{1}{8}$ "
C	9 $\frac{1}{8}$ "
D	$\frac{3}{8}$ "

With the adhesive **34** applied, the blank **28** is ready for formation into the carrier **16**. Portions of the blank **28** are folded along the cuts and creases **32** previously formed. In one embodiment, portions of the blank **28** are folded at an angle of about 180 degrees, as shown in FIG. **5**, such that the adhesive **34** contacts an opposing portion of the blank **28**. In an exemplary embodiment, this folding brings the adhesive **34** into contact with a clay coated side of the planar member **18**. Upon folding, the folded blank **28** is sufficiently compressed to provide adequate bonding of the adhesive **34** to hold the opposed portions of the blank **28** together. Also, the flaps **22A** and **22B** are offset from other portions of the blank **28** such that the positioning device **6** on the container **1** is slidably positionable and releasably retained with respect to the carrier **16**.

With the carrier **16** being thusly constructed, a plurality, such as 8, containers **1** can be loaded on to the carrier **16**. To do this, the grooves **10** on the positioning devices **6** on the containers **1** are substantially aligned with the flaps **22A** and **22B** on the carrier **16**. The containers **1** and the carrier **16** are moved with respect to each other such that the flaps **22A** and **22B** are inserted into the grooves **10** on the positioning devices **6**. The carrier **16**, and specifically the flaps **22A** and **22B** are constructed such that the flaps **22A** and **22B** are slidably within the grooves **10**.

This sliding movement is also facilitated by the lubricious coating **30** on the carrier **16**. It is to be remembered that, given the manner in which the carrier **16** was constructed, e.g. the folds, the coating **30** is present on container **1** engaging surfaces **36A** and **36B**, disposed on the flaps **22A** and **22B**, and **36C** disposed between the flaps **22A** and **22B**. The coating **30** provides a lubricious layer or surface to promote movement of containers **1** with respect to the carrier **16**. Of course, the coating **30** may be replaced with any other suitable coating to meet given requirements. Also, the carrier **16** is constructed such that optical surfaces of the containers **1** are not in contact with surfaces or other things, i.e. particulate and the like, that might adversely effect desired properties, such as light transmittance, etc., of those optical surfaces.

In some instances, once the containers **1** have been joined with the carrier **16**, the combination of the containers **1** and the carrier **16** may be wrapped with a suitable material, such as a sheet of a suitable polymer and the like. These wrapped carriers **16** may be transported in appropriate transport items, such as boxes.

Further advantages of the carrier **16** may become evident with reference to the following discussion of use of the carrier **16** bearing a plurality of containers **1**.

5

If the carrier **16** is wrapped, the wrapping material is removed and may be discarded. In one utilization, the carrier **16** is positioned with respect to a mounting element **26** (FIG. **7**) fixed to the vertical guides **14** on the instrument, as shown in FIG. **6**. In detail, the instrument engaging portion **24** of the carrier **16** is removably inserted into a slot **38** formed on the mounting element **26**. The mounting element **26** is constructed such that, upon insertion of the instrument engaging portion **24** into the mounting element **26**, the flaps **22A** and **22B** of the carrier **16** are substantially aligned with the vertical guides **14** of the loading device **7** such that the grooves **10** of the positioning device **6** on the containers **1** are also substantially aligned with the vertical guides **14** of the loading device **7**. With this positioning, it is possible for an operator to move the containers **1**, either one at a time or in groups, from the carrier **16** to the vertical guides **14** of the loading device **7**.

Once all or a desired number of the containers **1** have been moved from the carrier **16** to the loading device **7**, the operator can remove the carrier **16** from the mounting element **26**. Of course, the carrier **16** may be removed from the mounting element **26** at any time.

The instrument may include an unloading device which is constructed substantially identically to the loading device **7**, i.e. the unloading device may include substantially similar vertical guides. In this case, once the medical diagnostic analyzer is finished with a container **1**, the container **1** may be disposed on vertical guides comprising the unloading device. Because the unloading device is substantially identical to the loading device **7**, the carrier **16** may be connected with a mounting element **26** on the unloading device. Thus, containers **1** on the unloading device may be transferred to

6

the carrier **16** after use of the containers **1** by the medical diagnostic analyzer.

What is claimed is:

1. A carrier for a container having a positioning device to be used with a medical diagnostic analyzer having a container loading device, the carrier comprising:

(a) a planar member; and

(b) a container retaining member disposed on the planar member, the container retaining member having a configuration matable with the positioning device on the container and alignable with the container loading device on the medical diagnostic analyzer such that the container is releasably retained with the carrier and movable to the container loading device from the container retaining member upon alignment of the container retaining member with the container loading device of the medical diagnostic analyzer.

2. A carrier as defined in claim **1** wherein the planar member includes a container engaging surface having a lubricious coating.

3. A carrier as defined in claim **1** wherein the container retaining member comprises at least one flap removably insertable into a groove comprising the positioning device on the container.

4. A carrier as defined in claim **1** further comprising:

(c) a medical diagnostic analyzer engaging portion disposed on the planar member releasably matable with a mounting element on the medical diagnostic analyzer.

5. A carrier as defined in claim **1** wherein the container retaining member releasably retains a plurality of containers.

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